

OMI-HTAP INVENTORY V1.1 README FILE

The OMI-HTAP emission inventory (Liu et al., 2018) is developed based on OMI-based and HTAP emission inventories. The OMI-HTAP inventory provides monthly gridded anthropogenic SO₂ emissions with global coverage at a spatial resolution of $0.1^\circ \times 0.1^\circ$ for the period from 2005 to 2019. The non-energy emissions (from industry, residential and transportation) are combined as surface emissions and the energy emissions are renamed as elevated emissions. Note that aviation and shipping emissions are not included in the OMI-HTAP inventory.

Algorithm Description

The OMI-based emission catalogue (Fioletov et al., 2016) is used to develop the OMI-HTAP inventory. OMI-HTAP v1.1 uses the latest emission catalogue of nearly 600 sources, which is available at <https://so2.gsfc.nasa.gov/measures.html>. The emission catalogue (Fioletov et al., 2016) is based on version 1.3 level 2 (orbital level) OMI planetary boundary layer (PBL) SO₂ data produced with the principle component algorithm (PCA) algorithm (Li et al., 2013). Only observations centered within a rectangular area (hereafter called the fitting domain) that spreads $\pm L$ km across the wind direction, L km in the upwind direction and $3 \cdot L$ km in the downwind direction were used to estimate the emissions. The value of L was chosen to be 30 km for small sources (under 100 kt/yr), 50 km for medium sources (between 100 and 1000 kt/yr), and 90 km for large sources (more than 1000 kt/yr). Additional information on the algorithm is available from Fioletov et al. (2016). The annual SO₂ emissions, site coordinates, source type (power plants, smelters or sources related to the oil and gas industry) for each anthropogenic source in the catalogue for the period from 2005 to 2019 were used to construct OMI-HTAP.

The Task Force Hemispheric Transport Air Pollution (HTAP v2.2, available at http://edgar.jrc.ec.europa.eu/htap_v2) inventory is used to gap fill the OMI-based emissions. The HTAP v2.2 inventory provides annual and monthly gridded air pollutant emissions with global coverage at spatial resolution of $0.1^\circ \times 0.1^\circ$ for the years 2008 and 2010 (Janssens-Maenhout et al., 2015). The grid emission maps are provided for six categories (energy, industry, residential, ground transport, aviation, and shipping).

The OMI-based and the HTAP emission inventories were merged together to construct a harmonized inventory OMI-HTAP for the period from 2005 to 2019. For each grid cell in the HTAP inventory, its emissions were replaced by the OMI-based estimates if it is located inside the fitting domain of any sources in the OMI-based inventory; otherwise, its emissions remained to be combined with the OMI-based emissions. The OMI-based emissions for individual years were allocated to corresponding grid cells according to their coordinates. The emissions from power plants and other industrial facilities were categorized as emissions from the energy and industry sector in the OMI-HTAP inventory, respectively. The OMI-based annual emissions were further scaled by the HTAP monthly profiles averaged over the fitting domain for the corresponding sector to derive monthly emissions. That is, the OMI-based emissions were regarded as the single source in the fitting domain and the areas outside the fitting domain were gap-filled with the HTAP emission grid maps. The HTAP v2.2 inventory for years 2008 and 2010 was used when constructing the OMI-HTAP inventory prior to and after year 2008, respectively.

Product Description

The OMI-HTAP inventory is written as NetCDF file. Data files are available from the Aura Validation Data Center (AVDC) web site hosted by the Atmospheric Chemistry and Dynamics Branch at NASA Goddard Space Flight Center (GSFC). The information provided on the files includes latitude, longitude, SO₂ emissions and time. Twelve values of SO₂ emissions are provided corresponding to 12 months in a year.

References

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